EDUCATION AND WORLD DEVELOPMENT IN 1900-1999: A GENERAL VIEW AND CHALLENGES FOR THE NEAR FUTURE

GUISAN, Maria-Carmen*,
AGUAYO, E.
EXPOSITO, Pilar.

Abstract

This paper presents a comparison of exponential rates of growth in America, Europe, Africa and Asia-Pacific during the 20th century, and analyses the main causes that explain the important differences in Gross Domestic Product per inhabitant among these large areas. The paper emphasizes the convenience of fostering international cooperation, from now onwards, in order to increase expenditure per inhabitant on education in the poorer countries, as this condition is really needed for achieving a path of sustained economic development and for reaching success in an effective fight against poverty.

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1. Introduction

This is an introductory report that will be followed by further analyses of economic development, at area and country levels, in forthcoming editions of this journal. The main aim of this report is to present a general comparison of some variables which are highly relevant for understanding the real causes of wealth and poverty, in order to analyse the right policies for fostering international cooperation for an effective fight against poverty and for guaranteeing socio-economic rights to people all over the world.

* Faculty of Economics, University of Santiago de Compostela, Spain, e-mail: eccgs@usc.es

In section 2 we analyse the rates of growth during the period 1900-99 in America, Africa, Asia and Europe, while in section 3 we present a comparison of production by sector in some selected large areas and analyse the relation between the educative level of population and economic development and in section 4 we present the main conclusions.

2. Education and Development in America, Europe, Africa and Asia.

In table 1 we present the exponential rates of yearly growth of real Gross Domestic Product, Gdp, Population, Pop, and Gdp per inhabitant, Gdph, during the 20th century in Africa, Asia, Latin America, USA, Western Europe and the World, as well as our estimations of Gdp per inhabitant in 1900 and 1999, based on figures from several international sources. Gdph is measured at 1999 prices and Purchasing Power Parities, PPPs.

Table 1. Real Gdph and rates of yearly growth during the 20th century

Area	Gdph 1900	Gdph 1999	Exponential Rates		
			Gdp	Pop	Gdph
1.Africa	770	2074	3.12	2.12	1.0
2.Asia, excluding Japan	610	3582	3.32	1.53	1.79
3.Eastern Europe and ex-Ussr	1933	6662	1.91	0.66	1.25
4.Japan	1137	25975	4.22	1.05	3.16
5.Latin America	1471	7098	3.75	2.16	1.59
6.USA and Canada	4822	31319	3.14	1.25	1.89
7.Western Europe	3354	22667	2.40	0.47	1.93
World	1501	7031	2.97	1.40	1.56

Source: Own estimations based on figures by Maddison(2001), UN, WB, and other international statistics. The values of Gdph in 1900 and 1999 are expressed in US$ per inhabitant at 1999 prices and PPPs.

We can observe really big differences among different areas such as Japan and area 3, formed by Eastern Europe and former Soviet Union countries. Japan with a starting point, at 1990, very much below Eastern Europe and Russia has been able to reach at the

end of the century a real value of Gdp per inhabitant nearly 4 times higher than those countries.

Africa and Asia had a very low starting point at the beginning of the century but Asia has experienced a higher rate of growth of Gdph and has achieved a value of 3582 dollars per inhabitant in 1999 while Africa only could get an average of 2074.

Latin America show levels of Gdph very similar to world average both in 1990 and 1999. These group of countries has experienced an important average rate of increase in production, clearly over world average, with an average yearly rate of 3.75, only surpassed by Japan, but has had very high rates of population growth and thus a lower growth in Gdp per inhabitant.

As Gdph is the ratio between Gdp and Pop, it happens that the exponential rate of growth of Gdph, from year o to year t_t is exactly equal to the difference between the exponential rates of Gdp and Pop:

(1) Exp. Rate of Gdph = Exp. Rate of Gdp - Exp. Rate of Pop

$$Gdph_t = Gdp_t / Pop_t = Gdp_o\, e^{\lambda_1 t} / Pop_o\, e^{\lambda_2 t} = Gdp_o\, e^{(\lambda_1 - \lambda_2)t}$$

So the highest the growth of Gdp, given population growth, the highest the exponential rate of Gdph, and the highest the growth of Population, for a given rate of Gdp growth, the lowest the exponential rate of Gdph.

Western Europe has experienced one of the lowest average rates of Gdp growth but also the lowest rate of Population among the areas of table 1, and as a consequence has achieved one of the highest rates of growth in production per inhabitant.

In the case of USA and Canada the rates of growth used are those corresponding to the group that Maddison defines as Western Offshoots, formed by these countries, together with Australia and New Zealand.

We have calculated the exponential rates from compound rates, having into account the following relation between the exponential rate, λ*100, and the compound rate i*100:

(2) $$X_t = X_o\, e^{\lambda t}$$

(3) $$X_t = X_o\, (1+ i)^t$$

(4) $$e^{\lambda t} = (1+i)^t$$

(5) $$\lambda\, t = t \ln (1+i)$$

(6) $$\lambda = \ln (1+i)$$

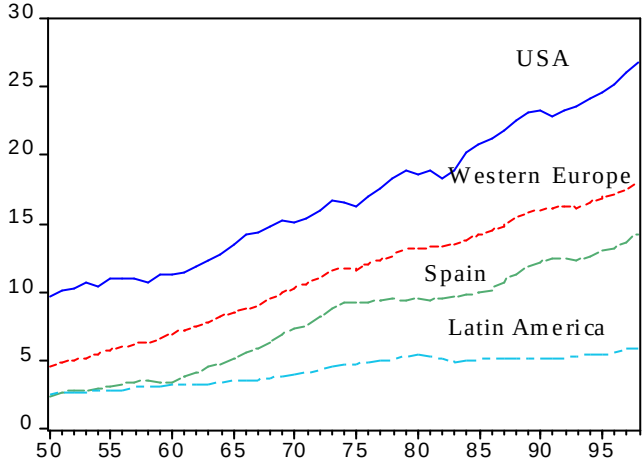
Graphs 1 and 2 show the evolution of production per inhabitant, Qh, during the period 1950-98 in USA (U), Latin America (Lat), Western Europe (Weu), Spain (E), Africa (Af) and Asia (As). The values of this variable correspond to Gdp per inhabitant in US$ at 1990 prices and purchasing power parities from Maddison(2001).

We include the value of Qh in Spain because this country has evolved from a level similar to Latin American average in 1950 to a higher level from 1960 to 1998, showing the path that many Latin American countries could have followed with rates of growth of Gdp and Population similar to Spain.

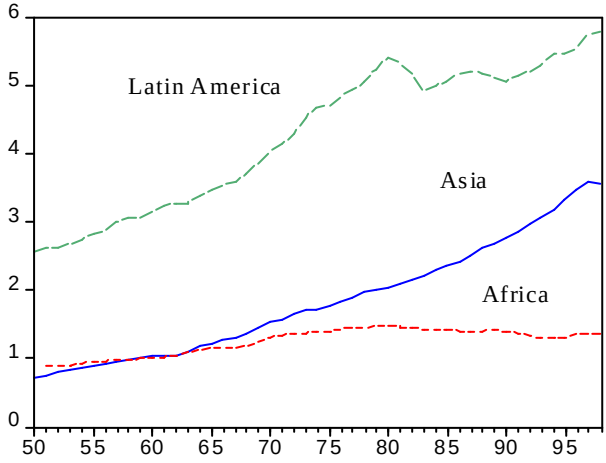
The yearly exponential rate of growth of real Gdp in Spain during the second half of 20th century has been 4.43%, only a little higher that the average rate of this variable in Latin American countries that was 4.04%, but the population growth has reached an average rate of only 0.72% in Spain and a high value of 2.32% in the case of Latin America.

The difference between the rates of growth of Gdp and Population gives a high 3.71% for the average rate of growth of real Gdp per inhabitant in Spain, and a more moderate value of only 1.74% for this rate in Latin America, during that period.

Graph 1. Real Gdp per inhabitant in USA, Western Europe, Latin America and Spain, 1950-98 (thousand US$ at 1990 prices and PPPs)



Graph 2. Real Gdp per inhabitant in Latin America, Asia and Africa, 1950-98 (thousand US$ at 1990 prices and PPPs)



It is very outstanding, from graph 3, the important difference between Africa and Asia, due to the higher yearly rates of growth in Asian production and to the lower yearly rates of growth in Asian population in comparison with Africa.

The areas with higher educative levels have also higher levels of real production per inhabitant, and thus a great priority of international cooperation is to foster the improvement of the educative level of population in the poorest areas, specially in Africa.

In the next section we can see the low levels of education expenditure that have the poorest areas in comparison with world average. In our view there is a clear lack of hope for future improvements in development of those areas if this situation is maintained during the next decades.

We will analyse also the evolution of production by sector and population in some selected areas during the period 1980-99.

2.- Education, Production and Population in 1980-99

Table 2 shows some important variables, such as the Total yeas of Schooling (Tyr), Public Education Expenditure per inhabitant (Eduh), Fertility rate (Fer), and Gdp per inhabitant in 1999 (Gdph), in several selected areas of the World.

In America the areas considered are: 1) USA and Canada, 2) Latin America.

The group of Europe includes some Euro-Asian countries like Turkey and Russia, and in this table also the countries belonging to former Soviet Union. The areas included in table 2 are: 1) Western Europe, 2) Central and East Europe, 3) Russia and ex-Ussr.

The African areas included in table 2 are: 1) Northern Africa, 2) Sahel and Central Africa, and 3) Southern Africa

Finally the Asian areas included in this table are: 1) Western Asia, 2) India and Southern Asia, 3) China and Northern East, excluding Japan, 4) Japan.

Total America, Europe, Africa and Asia were calculated collecting figures for all the areas, including also those that are not presented in table 2, and information available, or based on our own estimations, for 210 world countries which amount for nearly 100% of world population.

Table 2. Education, Fertility and Development in 1999

Area	Tyr	Eduh	Fer	Gdph
USA and Canada	12.1	1396	2.0	31319
Latin America	5.7	260	2.8	7098
Western Europe	8.6	995	1.5	22667
Central and East Europe	7.0	235	1.9	8372
Russia and ex-Ussr	6.9	212	1.0	5501
Northern Africa	4.8	237	3.3	4102
Sahel and Central Africa	2.5	21	6.6	997
Southern Africa	4.9	152	5.0	4614
Western Asia	4.6	244	5.3	7020
India and Southern Asia	4.5	46	3.4	2285
China and NE Asia, exc.Jp	6.2	149	1.8	4293
Japan	9.7	1003	1.4	25975
Total America	8.1	704	2.5	16129
Total Europe and ex-Ussr	7.7	562	1.4	13628
Total Africa	3.4	87	5.4	2074
Total Asia-Pacific	6.3	117	3.2	4389
World	5.8	258	2.8	7028

Note: Tyr is average total years of schooling in 1999, Eduh is Public Expenditure on education per inhabitant in 1995, Fer is fertility rate or average expected number of children per woman in 2000, and Gdph is Gross Domestic Product per inhabitant in 1999 (US$ at 1999 PPPs).

Finally table 3 present a summary of production by sector and per inhabitant in the year 1999 at world level. Agriculture (A) also includes Fishery and Forestry, while Industry (I) includes

Energy, Mining, Manufacturing and Building activities. The other activities correspond to Services (S), and ph99t is total Gdp per inhabitant.

Table 3
World Production per head and by sector, in 1999
(dollars per inhabitant at 1999 prices and PPPs)

Area	Ph99a	Ph99i	Ph99s	Ph99t
America	615	4369	11144	16127
Europe	568	4175	8905	13648
Africa	422	665	987	2074
Asia-Pacific	629	1695	2065	4389
World	591	2285	4154	7031

We can observe that production per inhabitant in Services is higher in areas with high levels of industrial production, and so Africa with the lowest level of production per head in Industry is also the large area with the lowest level of production per head in Services.

The higher level of production per inhabitant in Services of America in comparison with Europe, is explained because USA has a higher development of outsourcing in some business services than Western Europe.

In forthcoming reports of this journal this kind of information will be analysed at area and country level.

4.- Conclusions

1) During the 20th century the highest increases in real Gdp per inhabitant correspond to Japan, Western Europe and the group of USA and Canada, mainly due to their moderate rates of growth of population, and in the case of Japan also due to the high average rate of real Gdp growth.

2) Latin America has shown a high rate of growth of real Gdp but the different of this rate with the high rate of Population growth explain a rather low value in the rate of growth of Gdp per inhabitant. The low levels of education in the majority of Latin American countries at the middle of the century explain these excessive rates of population growth, over world average, and thus the moderation in the rates of increase of income per capita.

3) Some countries like Spain, with a similar level of Gdp per inhabitant in 1950, in comparison with Latin America, have experienced a higher degree of development due to higher expenditures on education and investment in industrial production and other factors.

4) We show our high concern in relation with African development as the average educative level of population is still too much lagged in comparison with other areas of the world. Many African countries can not afford a higher expenditure on education and need much more international cooperation than they have received before now. They should improve, urgently, their levels of industrial production and reduce their excessive average rates of fertility, and both changes need a clear improvement on average educative level of population.

5) The improvement of international cooperation should be performed having into account many policies suggested by Stiglitz(1998) and other authors, in order to open the closed international institutions to the dialogue and cooperation with experts and volunteers of many countries, both developed and underdeveloped, because the solutions to poverty and stagnation need thinking, implementing and supervising activities, and all these tasks are better performed with a dynamic relation among different groups of people really interested in achieving success in the fight against poverty.

Bibliography

Akal(2001). *El estado del mundo*. Published by Akal Ediciones. Madrid.

Barro, R. and Lee, J.W.(1997). "Schooling Quality in a Cross-section of Countries". *NBER Working Papers Series* nº 6198.

Guisan, M.C.; Aguayo, E. and Exposito, P.(2001). "Economic Growth and Cycles: Cross-country Models of Education, Industry and Fertility and International Comparisons". *Applied Econometrics and International Development*. Vol.1-1, pp. 9-38. Edited by Euro-American Assoc. of Economic Development Studies.

Maddison, A.(2001). *The World Economy. A Millennial Perspective*. Development Centre Studies. OECD.

Stiglitz, J.E.(1998). "Towards a New Paradigm for Development: Strategies, Policies and Processes". Prebisch Lecture at UNCTAD Geneva.

World Bank. *Report 2000*.